

What is claimed is:

1. A device for detecting at least one analyte in a patient, comprising:
at least one active electrode, said active electrode having a length such that said active electrode is adapted to pass through the stratum corneum to a depth sufficient to access said analyte to enable the electrochemical detection of said analyte; and
at least one auxiliary electrode configured to at least partially surround said active electrode, and adapted to contact patient's skin when the device is placed against said patient.
2. A device as claimed in claim 1, wherein:
said device further includes a base portion integral with said auxiliary electrode; and
said active electrode is extendable beyond said base portion to a length sufficient to access said analyte.
3. A device as claimed in claim 2, wherein:
said active electrode is retractable into said base portion.
4. A device as claimed in claim 3, wherein:
said active electrode is automatically extendable beyond said base portion and automatically retractable into said base portion.
5. A device as claimed in claim 3, wherein:
said active electrode is manually extendable beyond said base portion and automatically retractable into said base portion.
6. A device as claimed in claim 1, wherein:

said auxiliary electrode has an abraded surface which is adapted to contact said patient's skin.

7. A device as claimed in claim 1, wherein:

said auxiliary electrode is adapted to pass into the stratum corneum when contacting said patient's skin.

8. A device as claimed in claim 1, further comprising:

a data storage, adapted to store information pertaining to said at least one analyte or said patient.

9. A device as claimed in claim 1, further comprising:

a communication device, adapted to communicate information between said device and an external device.

10. A device as claimed in claim 1, wherein:

said device is adapted for wearing by said patient for a duration of time.

11. A device as claimed in claim 1, wherein:

said device is further adapted to detect at least one parameter of said patient, such that said length of said active electrode enables said active electrode to pass through the stratum corneum to said depth sufficient to access a component to enable the electrochemical detection of said parameter; and

said at least one analyte and said at least one parameter includes at least one of the following:

electrolytes, oxygen, nitric oxide, lactate, insulin, neurotransmitters, at least one drug, pH level in the patient's blood, the patient's temperature, resistance of the patient's skin, glucose oxidase, glucose dehydrogenase and lactate dehydrogenase.

12. A device as claimed in claim 1, further comprising:

a plurality of said active electrodes.

13. A device as claimed in claim 1, wherein:

said auxiliary electrode is configured to substantially entirely surround said active electrode.

14. A device as claimed in claim 1, wherein:

said auxiliary electrode is coupled to at least a portion of the surface of said base portion proximate to that from which said active electrode extends.

15. A device as claimed in claim 1, wherein:

said active electrode is further adapted to have an electrical potential applied thereto to enable the electrochemical detection of said analyte.

16. A device as claimed in claim 1, wherein:

said analyte is electrochemically active.

17. A device as claimed in claim 1, wherein:

said analyte is selected from nitric oxide, neurotransmitters, insulin, and oxygen.

18. A device as claimed in claim 1, wherein:

said active electrode is selected from antimony, ruthenium, rhodium, platinum, palladium, graphite, gold, and oxides thereof.

19. A device as claimed in claim 1, further comprising:

at least one reference electrode, disposed at a distance from said active electrode equal to or less than a distance between said active electrode and any portion of said auxiliary electrode, said reference electrode being adapted to provide a reference potential for said electric potential applied to said active electrode.

20. A device as claimed in claim 1, further comprising:
a plurality of active electrodes adapted to be positioned for use in a sequential manner.

21. A device as claimed in claim 20, wherein:
said plurality of active electrodes are contained after use.

22. A device as claimed in claim 1, further comprising:
a delivery device integral therewith.

23. A device as claimed in claim 22, wherein:
said device and said delivery device are adapted to communicate with each other to control administration of a substance that said delivery device delivers to said patient.

24 . A device for detecting at least one analyte in a patient, comprising:
at least one active electrode having a length such that said active electrode is adapted to pass through the stratum corneum of said patient to a depth sufficient to access said analyte; and

at least one substance adjacent to at least a portion of said active electrode capable of reacting with at least one analyte to produce at least one electrochemically active product; and

an auxiliary electrode configured to at least partially surround said active electrode, and adapted to contact said patient's skin when the device is placed against said patient.

25. A device as claimed it in claim 24, wherein:
said auxiliary electrode is configured to substantially entirely surround said active electrode.

26. A device as claimed in claim 24, wherein:

said device further includes a base portion integral with said auxiliary electrode; and

said active electrode is extendable beyond said base portion for a length sufficient to access said analyte.

27. A device as claimed in claim 26, wherein:

said active electrode is retractable into said base portion.

28. A device as claimed in claim 27, wherein:

said active electrode is automatically extendable beyond said base portion and automatically retractable into said base portion.

29. A device as claimed in claim 27, wherein:

said active electrode is manually extendable beyond said base portion and automatically retractable into said base portion.

30. A device as claimed in claim 24, wherein:

said auxiliary electrode has an abraded surface which is adapted to contact said patient's skin.

31. A device as claimed in claim 24, wherein:

said auxiliary electrode is adapted to pass into the stratum corneum when contacting said patient's skin.

32. A device as claimed in claim 24, further comprising:

a data storage, adapted to store information pertaining to said at least one analyte or said patient.

2025-04-24 10:00:00

33. A device as claimed in claim 24, further comprising:
a communication device, adapted to communicate information between said device and an external device.

34. A device as claimed in claim 24, wherein:
said device is adapted for wearing by said patient for a duration of time.

35. A device as claimed in claim 24, wherein:
said device is further adapted to detect at least one parameter of said patient, such that said length of said active electrode enables said active electrode to pass through the stratum corneum to said depth sufficient to access a component to enable the electrochemical detection of said parameter; and

said at least one analyte and said at least one parameter includes at least one of the following:

electrolytes, oxygen, nitric oxide, lactate, insulin, neurotransmitters, at least one drug, pH level in the patient's blood, the patient's temperature, resistance of the patient's skin, glucose oxidase, glucose dehydrogenase and lactate dehydrogenase.

36. A device as claimed in claim 24, further comprising:
a plurality of said active electrodes.

37. A device as claimed in claim 24, wherein:
said auxiliary electrode is coupled to at least a portion of the surface of said base portion proximate to that from which said active electrode extends.

38. A device as claimed in claim 24, wherein:
said active electrode is further adapted to have an electric potential applied thereto to enable reaction between said analyte in said patient and said substance to produce at least one electrochemically active product.

39. A device has claimed in claim 24, further comprising:

at least one reference electrode, disposed at a distance from said active electrode equal to or less than a distance between said active electrode and any portion of said auxiliary electrode, said reference electrode being adapted to act as a reference potential for said electric potential applied to said active electrode.

40. A device as claimed in claim 24, wherein:

said substance is selected from glucose oxidases, glucose dehydrogenases, and electrochemically responsive receptors.

41. A device as claimed in claim 24, further comprising:

a plurality of active electrodes adapted to be positioned for use in a sequential manner.

42. A device as claimed in claim 41, wherein:

said plurality of active electrodes are contained after use.

43. A device as claimed in claim 24, further comprising:

a delivery device integral therewith.

44. A device as claimed in claim 22, wherein:

said device and said delivery device are adapted to communicate with each other to control administration of a substance that said delivery device delivers to said patient.

45. A method for detecting an electrochemically active component in a patient, comprising:

placing a device against the skin of said patient, said device having at least one active electrode, said active electrode having a length adapted to pass through the stratum corneum of said patient to a depth sufficient to access said analyte, said

device having at least one auxiliary electrode configured to at least partially surround said active electrode, said auxiliary electrode being adapted to contact said patient's skin when said device is placed against said patient;

applying a potential to said active electrode; and,

measuring current or charge from the electrochemical reaction of said electrochemically active component and said active electrode.

46. A method as claimed in claim 45, wherein

said measuring is selected from integrated current, derivative of current, and derivative of charge.

47. A method as claimed in claim 45, wherein:

said applying an electric potential to said active electrode is selected from ramped, stepped, pulsed, programmed pulse and combinations thereof.

48. A method as claimed in claim 45, wherein said applying step comprises:

adjusting the amount of said electrical potential applied to said active electrode with reference to a reference electrode of said device wherein said reference electrode is disposed at a distance equal to or less than between said active electrode and any portion of said auxiliary electrode.

49. A method as claimed in claim 45, wherein:

said device further includes a base portion integral with said auxiliary electrode; and

said method further includes extending said active electrode beyond said base portion to a length sufficient to access said component.

50. A method as claimed in claim 49, further comprising:

retracting said active electrode into said base portion.

51. A method as claimed in claim 50, wherein:
said extending and retracting of active electrode are performed automatically.

52. A method as claimed in claim 50, wherein:
said extending and retracting of active electrode are performed manually.

53. A method as claimed in claim 45, wherein:
said auxiliary electrode has an abraded surface which is adapted to contact
said patient's skin.

54. A method as claimed in claim 45, wherein:
said auxiliary electrode is adapted to pass into the stratum corneum when
contacting said patient's skin.

55. A method as claimed in claim 45, further comprising:
storing information pertaining to said component.

56. A method as claimed in claim 45, further comprising:
communicating information between said device and an external device.

57. A method as claimed in claim 45, further comprising:
wearing said device on said patient for a duration of time.

58. A method as claimed in claim 45, wherein:
said device includes a plurality of said active electrodes; and
said method includes performing said placing, applying and measuring steps
using said plurality of active electrodes.

59. A method as claimed in claim 45, further comprising:

enabling said device and a delivery device to communicate with each other to control administration of a substance that said delivery device delivers to said patient.

60. A method as claimed in claim 45, wherein said component includes one of the following:

an electrolyte, oxygen, nitric oxide, lactate, insulin, neurotransmitters, a drug, pH level in the patient's blood, a component indicative of the patient's temperature, a component indicative of resistance of the patient's skin, glucose oxidase, glucose dehydrogenase and lactate dehydrogenase.

61. A method for detecting a component in a patient, comprising:

placing a device against the skin of said patient, said device having at least one active electrode, said active electrode having a length adapted to pass through the stratum corneum of said patient to a depth sufficient to access said analyte, said active electrode having at least one substance adjacent to at least a portion of said active electrode to enable said component to react with said substance to produce at least one electrochemically active product, said device having at least one auxiliary electrode configured to at least partially surround said active electrode, said auxiliary electrode being adapted to contact said patient's skin when said device is placed against said patient;

applying a potential to said active electrode; and

measuring current based on said reaction of said electrochemically active component in said patient and said substance.

62. A method as claimed in claim 61, wherein

said measuring is selected from integrated current, derivative of current, and derivative of charge.

63. A method as claimed in claim 61, wherein:

said applying an electric potential to said active electrode is selected from ramped, stepped, pulsed, programmed pulse and combinations thereof.

64. A method as claimed in claim 61, wherein said applying step comprises:
adjusting the amount of said electrical potential applied to said active electrode with reference to a reference electrode of said device wherein said reference electrode is disposed at a distance equal to or less than between said active electrode and any portion of said auxiliary electrode.

65. A method as claimed in claim 61, wherein:
said substance is selected from glucose oxidases, glucose dehydrogenases, and electrochemically responsive receptors.

2025 RELEASE UNDER E.O. 14176